



## Notre Dame extended Research Community

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Introducing nanoscience to  
K-12 students

Michael Crocker  
Valerie Goss  
Rebecca Quardokus

# What is nanoscience and why should you care about it?

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- “Nanoscience refers to the ability to manipulate atoms and molecules, making it possible to build machines on the scale of human cells, or create materials and structures from the bottom up with novel properties.”
- “Nanoscience could change the way almost everything is designed and made, from automobile tires, to vaccines, to objects not yet imagined.”  
**[www.nsf.gov](http://www.nsf.gov)**
- There is a need to increase the number of students interested in science and expose them to opportunities which will allow the nanoscience community to grow. Students need to be prepared for jobs with future technology.



# Who are we?

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## National Science Foundation Grant

(NDeRC) Notre Dame extended Research Community

Faculty and graduate students, High School teachers and students

### Nanoscience/Nanotechnology Collaboration

|                   | <u>Faculty Advisor</u>      | <u>Graduate Student</u>     |
|-------------------|-----------------------------|-----------------------------|
| Advisor/Mentor 1: | Professor Marya Lieberman   | Valerie Goss                |
| Advisor/Mentor 2: | Professor Alex Kandel       | Rebecca Quardokus           |
| Advisor/Mentor 3: | Professor Sharon Hu         | Michael Crocker             |
| Lead Teacher 1:   | Lynda Rose                  | Penn High School            |
| Lead Teacher 2:   | Sharon Brandt               | LaSalle Intermediate Center |
| Lead Teacher 3:   | Patrick Malone              | Trinity School at Greenlawn |
| 1 HS Student :    | Trinity School at Greenlawn |                             |
| 2 HS Students:    | St. Joseph High School      |                             |



# Hello, I'm Becky Quardokus

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Lakeshore High School in  
Stevensville, Michigan



B.S. at Grand Valley State  
University, Chemistry Major

Working on a Ph.D. in Chemistry at  
Notre Dame



# Hello, I'm Michael Crocker

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Blanchet High School  
in Salem, Oregon



B.S. at Notre Dame,  
Computer Engineering

Working on a Ph.D. in Computer  
Engineering at Notre Dame

# Hello, I'm Valerie Goss

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- Lindblom Technical High School in Chicago, IL
- B.S. at Chicago State University and M.S. in Biochemistry & Geology
- Working on Ph.D. in Chemistry at Notre Dame.



# What have we been doing?

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Historically, University of Notre Dame has been involved with high school teachers in South Bend and the surrounding community for more than five years.

- NDeRC 2009 summer research and symposium
- Hosted Penn High School Biology Students
- Ethos Science Spooktacular (Encouraging technology and hands on science)
- Road Trip to Purdue's Birck Nanotechnology Center and Bindley Bioscience Center. Discovery Park, showcases interdisciplinary research.
- “Our Place” Place-based Education Project Workshop
- Ivy Tech Nanoscience Workshop
- Classroom Teaching
- Mentor High School student research
- Pedagogy Seminar Series (Marilyn Nash and Connie Sprague both of Indiana University-South Bend's School of Education)

**“Becky and Val Nanoscience Show”**



# Taking our science to the classroom

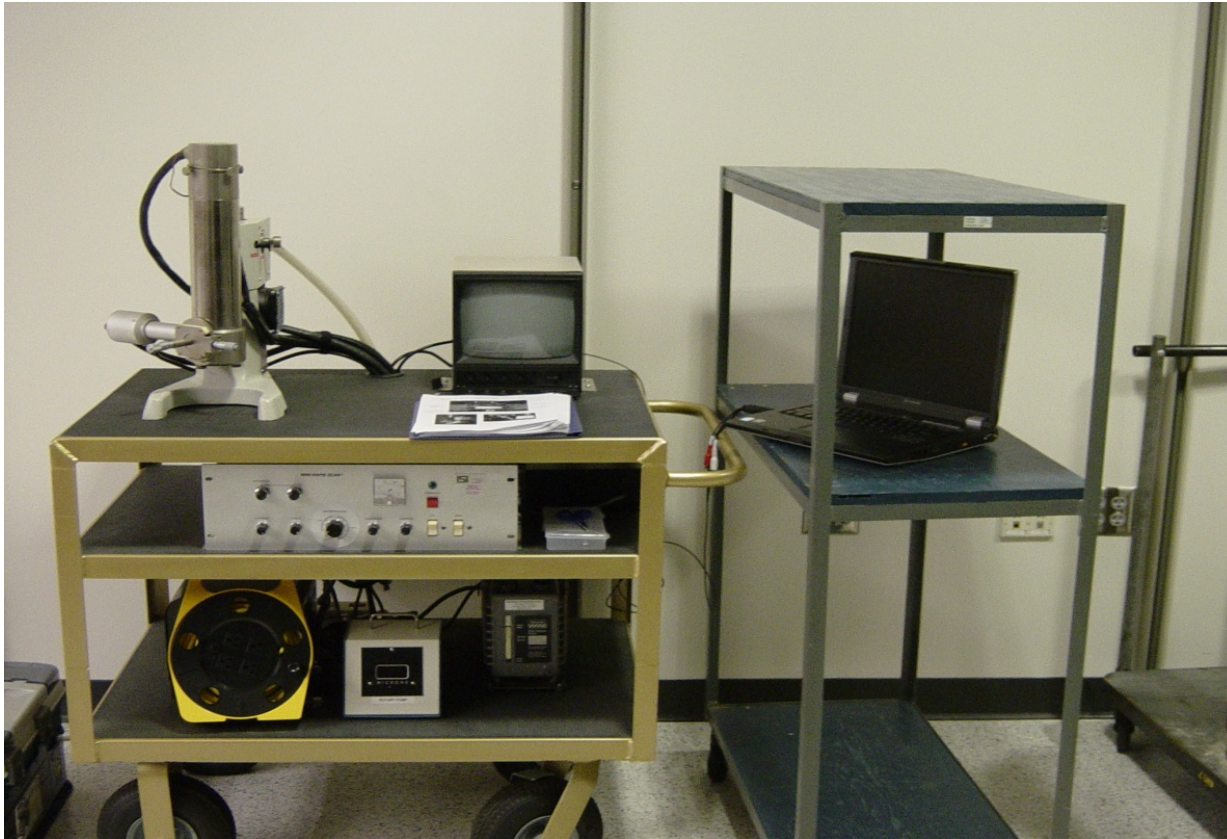
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# Scanning Electron Microscope (SEM)

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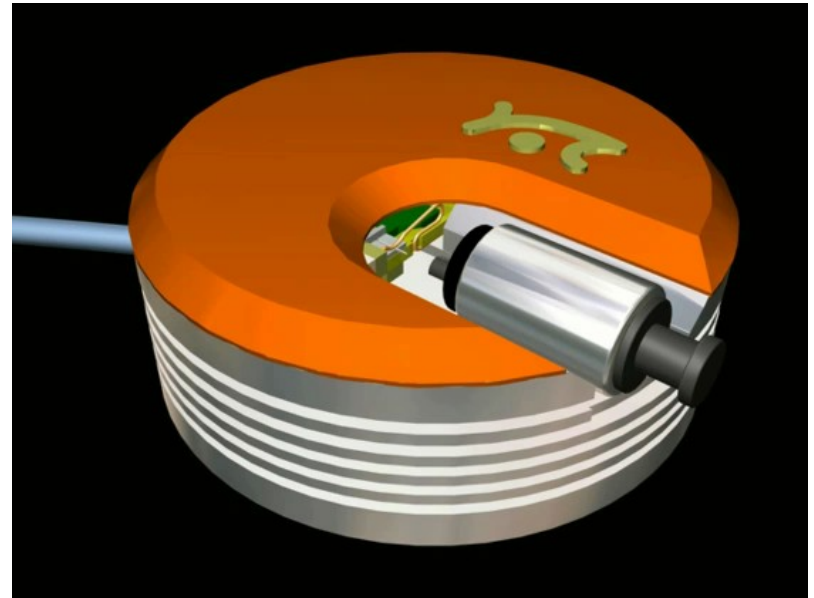
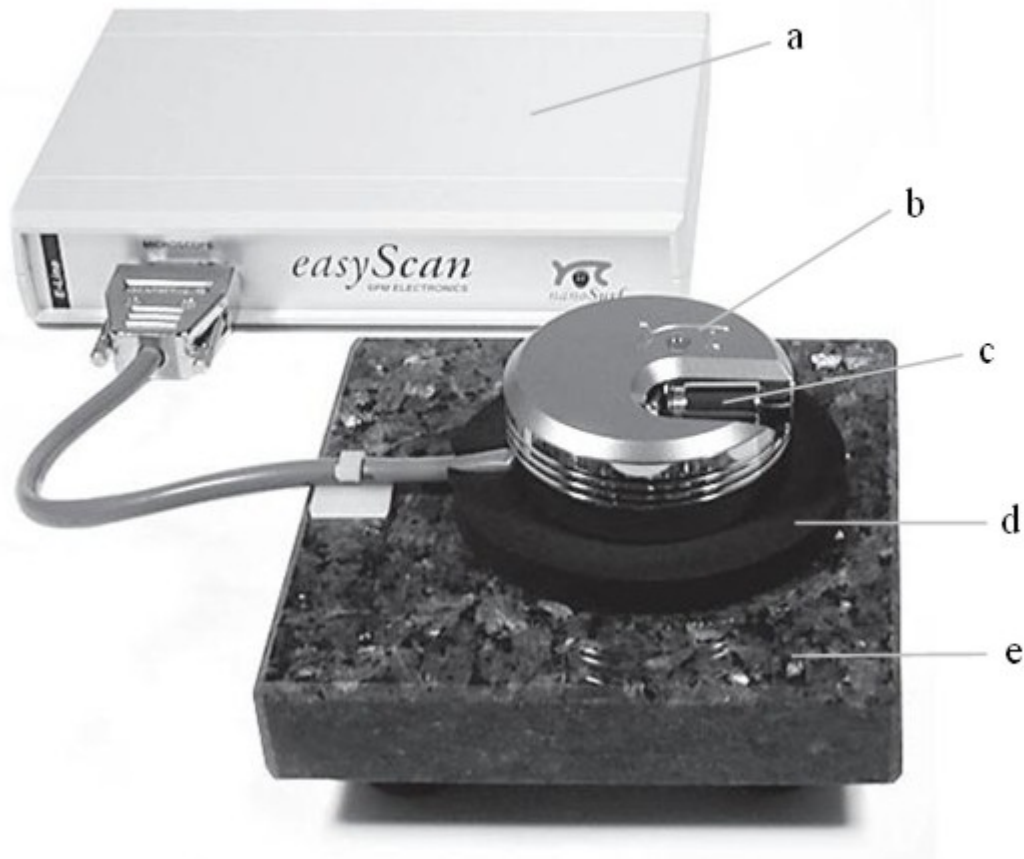
# Atomic Force Microscope (AFM)

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# Scanning Electron Microscope (STM)

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# What's next?

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## Broader Goals

- Build a platform for K-12 scientific learning standards using the portable microscopes.
- Increase student awareness and participation in advanced scientific careers

## Short Term Tasks

- Make contacts with area high school teachers for classroom visits.
- Develop hands on instructional materials for grades 5-8.
- Make connections with parents to seek support for these objectives.



# We value you!

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- Feedback from you
  - How important are these goals to you as a teacher, parent, student?
- Discuss how we can achieve these goals
  - Can you offer suggestions on what avenues we should pursue to achieve these goals?
- What would you like to see us do in the schools, in your community?



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# Thank you!

